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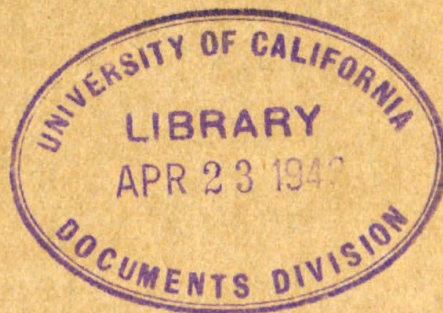
U.S. War Dept Army

WAR DEPARTMENT

TECHNICAL MANUAL

THE HORSE GAS MASK, M4 AND M5

November 13, 1942



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TECHNICAL MANUAL

THE HORSE GAS MASK, M4 AND M5

CHANGES }
No. 1 }

WAR DEPARTMENT

Washington 25, D. C., 19 February 1946

TM 3-230, 13 November 1942, is changed as follows:

5. General

* * * * *

b. COMPONENTS.

* * * * *

(6) *Harness.* A special harness * * * harness and saddle. If properly adjusted, the mask harness does not interfere with normal movement of the animal. Be sure that straps of the mask harness are not pulled so tightly that they cause discomfort to the animal and unnecessary strain on the mask.

c. PRINCIPLE OF OPERATION.

* * * * *

(2) The muzzlepiece provides * * * upon the animal. Muzzlepieces must be removed to allow animals to eat and drink but masked animals who thrust their muzzles into water suffer neither discomfort nor difficulty in breathing after muzzlepiece has been withdrawn from water.

d. LIMITATIONS. (1) *In wearing time.* The M4 and M5 * * * at any gate. Animals suffer little discomfort and their efficiency is unimpaired when masks are worn for periods up to 5 minutes at a hard gallop, 4½ hours at lesser gaits, and 5 hours while standing. Most animals do not require special training to become accustomed to wearing masks. Difficulty in masking partially trained animals may be overcome by having two men adjust the masks. The mask can * * * about 45 seconds.

* * * * *

(4) *In canister life.* Life of the * * * fail to protect. Except in case of mechanical damage or displacement of the canister filling, any failure of the canisters occurs gradually. Another factor influencing * * * becomes excessively damp.

6. Horse Gas Mask M4. (See fig. 4.)

* * * * *

a. MUZZLEPIECE. (See figs. 5 and 6.)

* * * * *

(5) The muzzlepiece is * * * and two keepers. When adjusting the mask to a small animal, muzzle straps should not be drawn so tightly that they press the rubber against the animal's nostrils. When adjusting muzzlepiece to a horse equipped with a bridle having curb bit and lip thong, loosen the lip thong before adjustment and refasten after muzzlepiece is in place.

* * * * *

c. MUZZLEPIECE CARRIER. (1) Although made of * * * $9\frac{9}{16}$ inches deep. The cover flap, which bears the CWS insignia, is generally triangular in shape and equipped with three lift-the-dot fas-

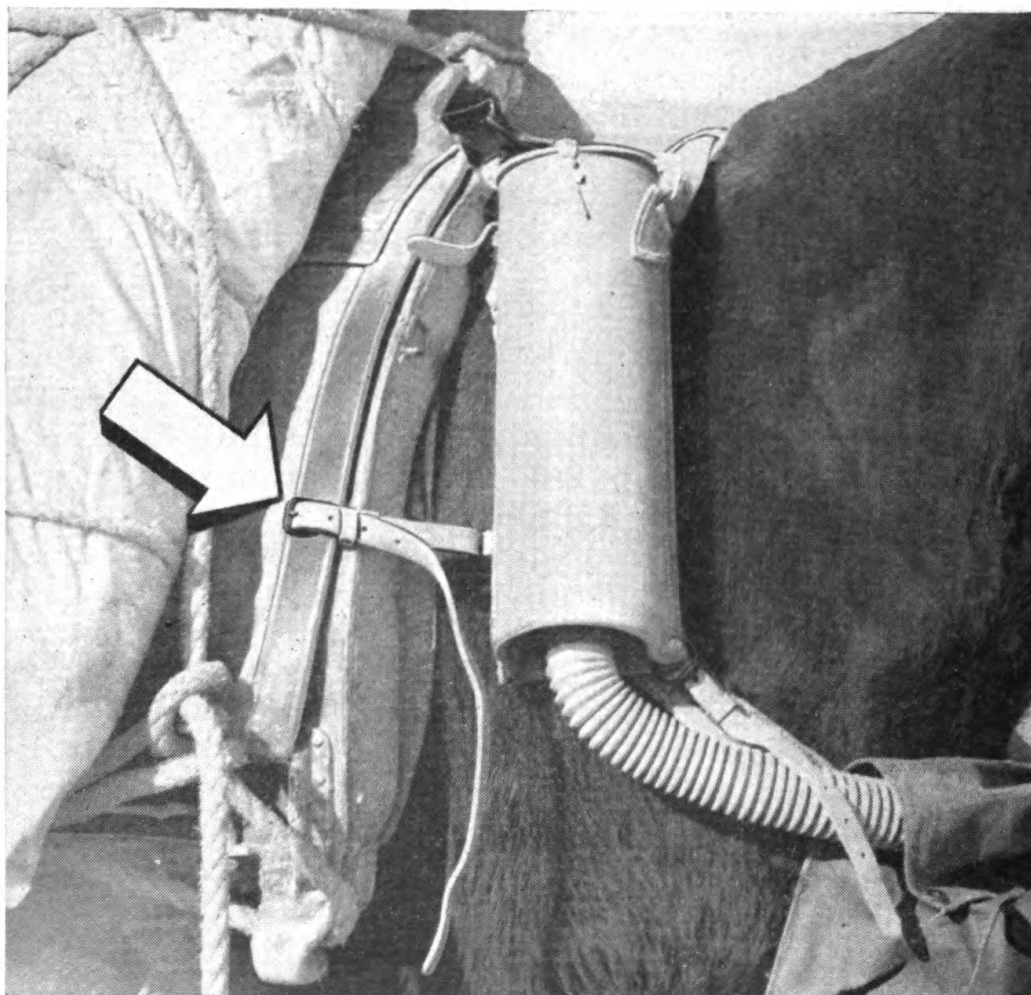


Figure 9.1. Masked mule with Phillips cargo pack saddle and pack. Right and left side straps of horse gas mask, M4, are attached through holes cut in saddle pad.



Figure 9.2. Neck strap of horse gas mask, M4, with keeper resewed to prevent lateral movement of strap from turning neck pad over.

teners for closing the carrier when the muzzlepiece is being carried and after muzzlepiece is adjusted to the muzzle.

* * * * *

(3) The girth strap * * * buckle and keeper. Fastening of girth strap is simplified, when animals are always assigned the same saddles and masks, by leaving strap attached to cinch of saddle instead of to mask.

* * * * *

e. CANISTER CARRIERS.

* * * * *

(2) Three inches below * * * pommel with snaps. Baling wire may be used to secure pommel straps to pack saddles which do not have pommel rings. Straps should be carefully adjusted so that canisters are suspended high enough to prevent their weight from being borne on the point of the withers. Side straps are * * * of dee rings. Their opposite ends are fastened to the girth or to holes cut in each side of the Phillips cargo pack saddle pad. (See fig. 9.1.)



Figure 13.1. Team of masked draft horses, with M4 mask on nearside horse and M5 mask on offside horse.

(3) The two canister * * * the right canister. Before fastening the snap, turn it one-half turn clockwise, with respect to the nearside of the animal. This helps to keep the neck pad from turning over, which would cause the buckle to cut into the animal's neck. Excessive lateral movement of neck strap, which also tends to turn the neck pad over, may be corrected by sewing keepers $\frac{1}{4}$ inch closer to center of each side of neck pad. (See fig 9.2.) The neck pad is * * * $2\frac{5}{8}$ inches wide.



Figure 13.2. Center pommel strap of M5 mask arranged to alleviate chafing. Cover of forward canister has been pierced and the strap passed through the hole.

7. Horse Gas Mask M5. (See fig. 10.) Individual components of * * * as described below. The M5 mask may be fitted to off-side animals of draft teams with little or no rearrangement of harness. (See fig. 13.1.) Some alteration of harness becomes necessary when this mask is used with the Phillips cargo pack saddle, packer's saddle, and officer's training saddle. The M5 mask is not designed for use on nearside horses of draft teams, nor on animals equipped only with surcingle and halter.

* * * * *
e. HARNESS.

* * * * *
(2) (Superseded.) The canister carrier is suspended from the saddle by three straps, each equipped with a buckle, two keepers, and a snap. The center pommel strap, 26 inches long and $\frac{5}{8}$ inch wide, leads from the upper forward corner of the canister carrier to the center pommel on the saddle. Any tendency of the canister carrier to chafe the animal's hide may be alleviated by cutting a hole in the forward cover of the canister carrier and passing the center pommel strap

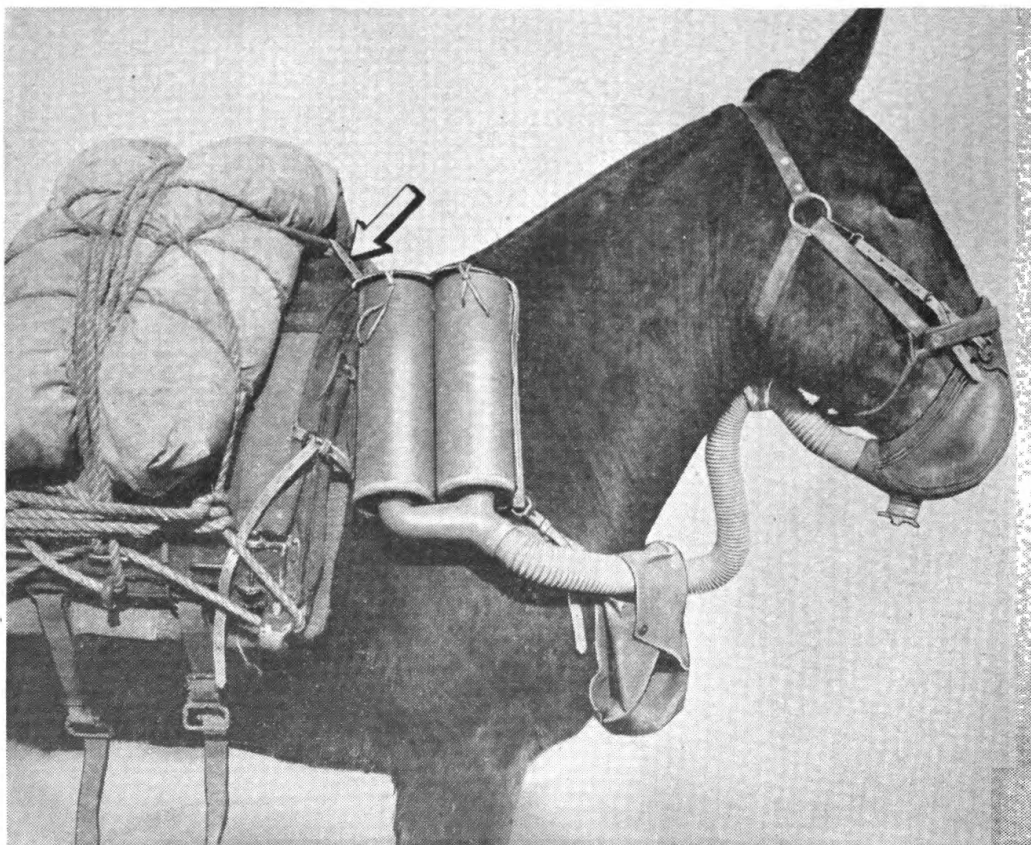


Figure 13.3. Method of attaching right pommel strap of M5 mask to rope of pack on mule equipped with Phillips cargo pack saddle.

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through it. (See fig. 13.2.) The right pommel strap, located at the upper rear corner of the canister carrier, is usually attached to the right side of the pommel, but when the mask is fitted to an animal with a Phillips cargo pack saddle, this strap may be attached to the rope which secures the pack. (See fig. 13.3.) The side strap leads from the lower rear corner of the canister carrier to the girth, or to the spider ring on the saddle if one is provided, or to a hole cut in saddle



Figure 13.4. Side strap of M5 mask attached through hole cut in pad of Phillips cargo pack saddle.

pad of the Phillips cargo pack saddle. (See fig. 13.4.) The side strap is 26 inches long by $\frac{5}{8}$ inch wide.

[AG 300.7 (22 Jan 46)]

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Refer to FM 21-6 for explanation of distribution formula.

TECHNICAL MANUAL)
NO. 3-230)

WAR DEPARTMENT,
Washington, November 13, 1942.

THE HORSE GAS MASKS, M4 AND M5

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SECTION I

GENERAL

1. PURPOSE. This manual is published for the information and guidance of personnel charged with the issue, use, alteration, repair, and testing of horse gas masks M4 and M5 in the field. These masks are designed to protect the respiratory organs of horses and mules against field concentrations of chemical warfare agents.



Figure 1. Horse Gas Mask, M4, in Wearing Position.

2. SCOPE. The manual covers construction, maintenance, care, inspection, and repair of both the M4 and M5 masks. Directions for packing, storage, and shipment are also discussed.

3. REFERENCES. A list of references regarding the horse gas mask appears in the Appendix.

4. BASIS OF ISSUE. The basis for issue of horse gas masks will be found in appropriate tables of basic allowances.

SECTION II

DESCRIPTION

5. GENERAL. Horse gas masks discussed in this manual serve the same general purpose as masks used by men, except that no provision is made for protection of the animal's eyes. The purpose of the mask is to purify air which the animal breathes while in an atmosphere contaminated with toxic or irritating gases, vapors, or smokes. Since the horse breathes through its nostrils only, and never through its mouth, the mask affords protection primarily for the muzzle.

a. Types of masks. (See figs. 1 and 2). Characteristics of the horse gas masks M4 and M5 are generally alike, modification being provided on each model to meet the requirements for use with specific types of saddles. With the M4 mask one canister is carried on either shoulder of the horse, while with the M5 both canisters are carried on the off (right) shoulder. The latter model is designed specifically for horses saddled to carry a rifle on the near (left) side, the weight of the canisters balancing that of the rifle. The entire assembly of the M4 mask weighs 15-4/5 pounds, and the M5 mask, 15 pounds. Compared with a human mask weighing 5 pounds, or 3 percent



Figure 2. Horse Gas Mask, M5, in Carry Position.

of the weight of a 160-pound man, the horse mask weighs only 1.3 percent of the weight of a 1,200-pound horse.

b. Components. In either model, M4 or M5, the complete gas mask consists of six principal parts--the canisters, canister carriers, hose, muzzlepiece bag, muzzlepiece, and harness.

(1) Canisters. These are provided for purifying air before it is breathed by the horse. The canisters contain absorbents and filters for cleansing air of gaseous agents and minutely divided solids.

(2) Canister Carriers. Special carriers are provided because of the unusual size of the canisters, necessitated by the large lung capacity of the horse.

(3) Hose. Flexible tubing provides a channel through which purified air passes from the canisters to the muzzlepiece.

(4) Muzzlepiece Carrier. The carrier accommodates both the muzzlepiece and that portion of the hose which--when the mask is worn--extends from the muzzlepiece back to the carrier.

(5) Muzzlepiece. This device, fitting over the animal's muzzle, is equipped with inlet and outlet valves to permit free inhalation and exhalation.

(6) Harness. A special harness, fitted with appropriate buckles and snaps, facilitates firm fastening of the mask assembly to the regular harness and saddle. The mask harness does not interfere with normal movement of the animal.

c. Principle of operation (See fig. 3). (1) Air is drawn into the mask assembly as the animal inhales. It first

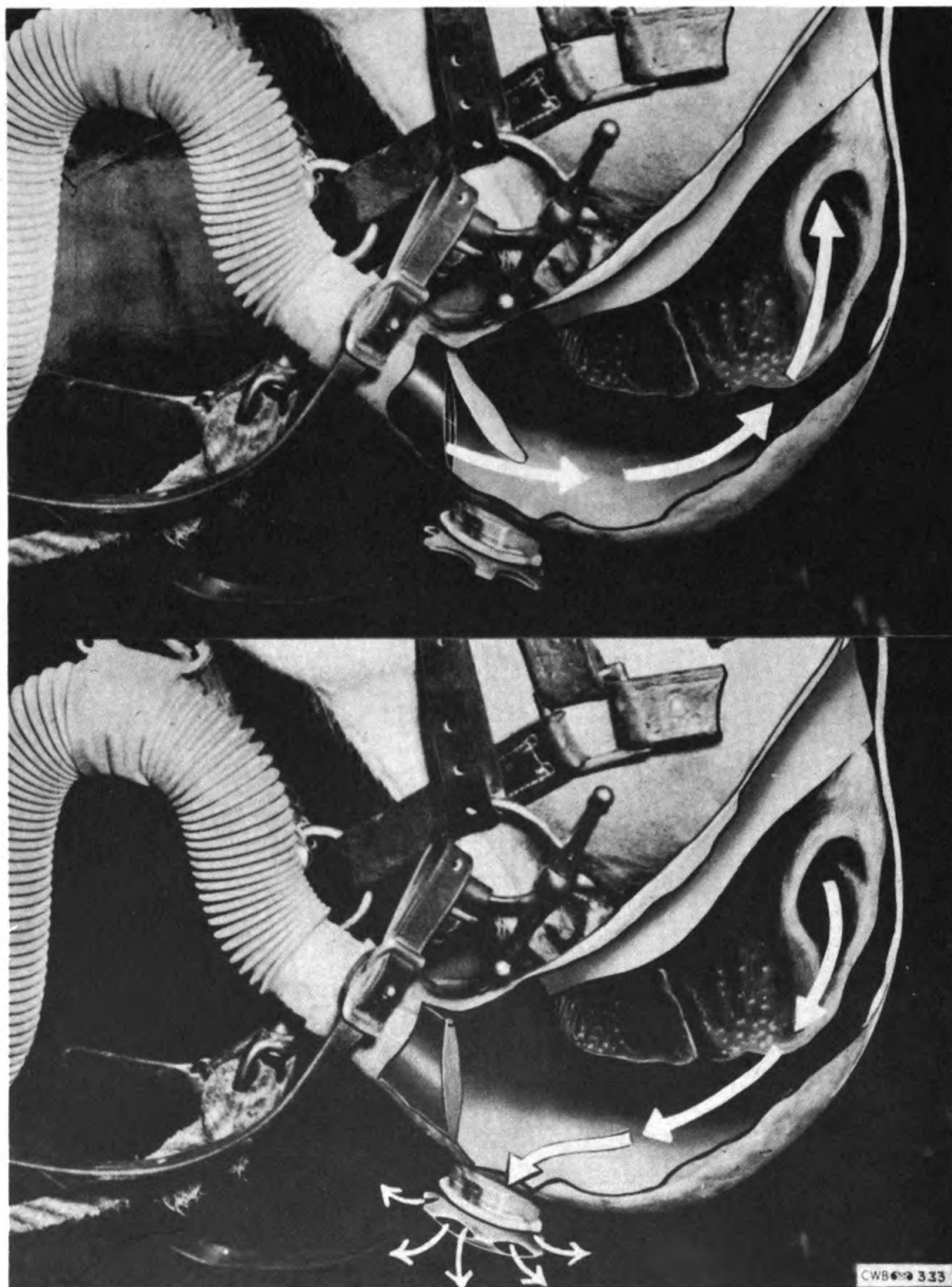


Figure 3. Airflow System of Horse Gas Mask.

passes through the canister, which contains a filtration system consisting of both mechanical and chemical filters, the former filtering out solid and liquid particles (smoke and dust) and the latter adsorbing toxic and irritating gases and vapors. After being purified, the air is drawn to the animal's muzzle for inhalation. Upon exhalation the breath is expelled from the mask through an outlet valve. The inlet valve is equipped with a flap which closes during exhalation to prevent used air from returning to the canisters, while the outlet valve is drawn closed during inhalation.

(2) The muzzlepiece provides a gastight seal over the muzzle, at the same time making adequate provision for the animal's comfort. Unlike their predecessor, the M3 mask, the M4 and M5 masks have no plate to fit in the mouth. Although a small amount of gas sometimes penetrates between the bits of the double bridle, especially on small, thin-lipped horses, such penetration exerts no ill effect upon the animal.

d. Limitations. (1) In wearing time. The M4 and M5 masks can be worn by animals traveling at any gait. In tests, the masks have been left in place for periods ranging from 5 minutes at a hard gallop to 2 hours at lesser gaits, and 5 hours while standing. The mask can be adjusted from the carry to the gas position in about 45 seconds.

(2) In protection. Respiratory protection provided by the M4 and M5 masks is approximately the same as that provided for human beings. (See TM 3-205). Horses' eyes, which are not protected, are affected only by vesicant agents and toxic dusts.

(3) In breathing resistance. Tested at an air flow of 450 liters per minute, the masks produced the following results:

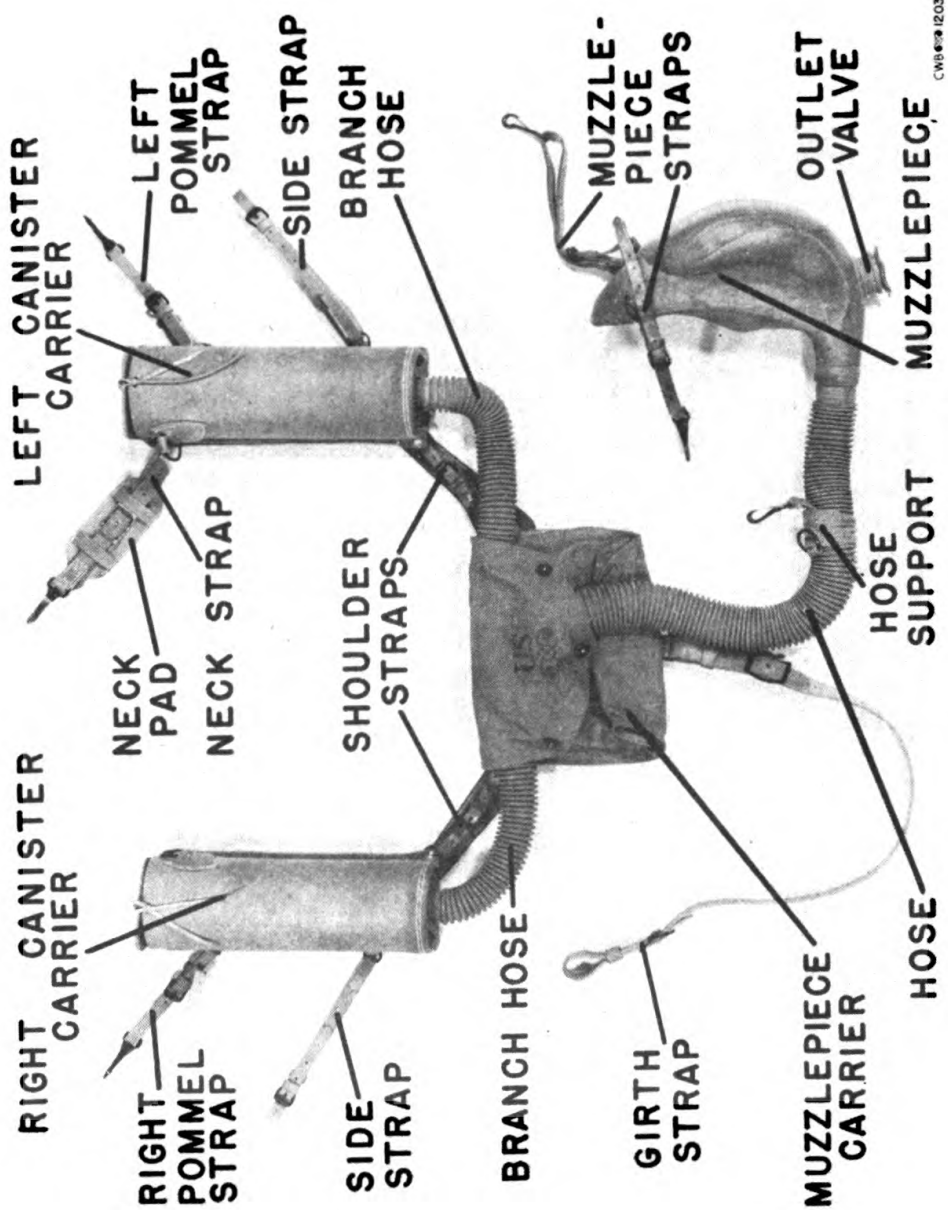


Figure 4. Nomenclature of Horse Gas Mask, M4.

	<u>M4</u>	<u>M5</u>
	mm	water
Muzzlepiece, including inlet valve . . .	2.5	2.5
Hose, including fittings	7.5	11.5
Canisters	35.0	35.0
Total inhalation resistance	45.0	49.0
Exhalation resistance	13.0	13.0

(4) In canister life. Life of the canisters depends largely upon the quantity of gas they are required to filter from the air. In very high concentrations the life may therefore be short, while in low concentrations several months may pass before the canisters become so saturated that they fail to protect. Except in case of mechanical damage, any failure of the canisters occurs gradually. Another factor influencing canister life is "channelizing," which usually occurs when the filter becomes excessively damp.

6. HORSE GAS MASK, M4. (See fig. 4). This model is designed for use with the McClellan saddle, officers' field saddle, Phillips pack saddle, Quartermaster stock saddle, the various types of draft harness, and for horses equipped only with a halter and surcingle. A corrugated rubber hose extends from the bottom of each shoulder canister, joining at a T-shaped metal connection inside the canister carrier. From this point a single rubber hose extends to the muzzlepiece. Air enters through a series of holes in the bottom of each canister, is purified within the canister, then passes through the rubber hose to the muzzlepiece where it is breathed by the animal. Exhaled air and saliva are emitted through a rubber outlet valve at the bottom of the muzzlepiece.

a. Muzzlepiece. (See figs. 5 and 6). (1) The molded rubber muzzlepiece, including valves and straps, weighs 2-3/10 pounds, and is approximately 13 inches long and 7 inches wide. It will fit all horses and mules. Rubber in the top and forward

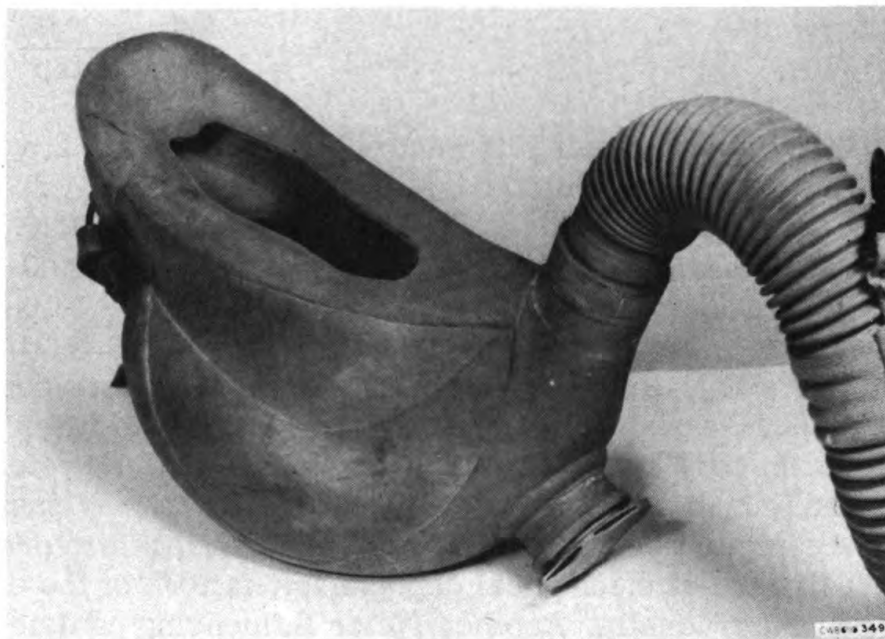


Figure 5. Muzzlepiece, Showing Aperture.

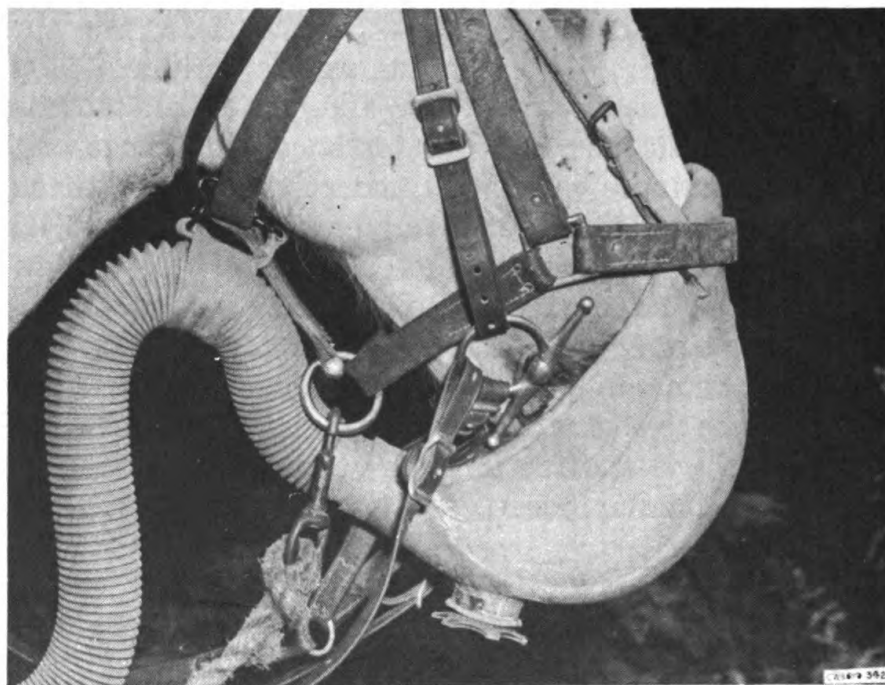


Figure 6. Muzzlepiece in Position.

portions of the muzzlepiece is about $5/32$ of an inch thick, and in the lower and rear parts about $7/32$ of an inch. Thus the muzzlepiece is stiffened over the nostrils to prevent collapse, but is made thinner elsewhere to decrease the weight. A slight amount of flexing may occur during inhalation, especially when the horse is breathing hard.

(2) The rear portion is drawn into an inlet tube with an inner diameter of $1-3/4$ inches, into which an inlet valve ferrule is inserted. The ferrule is made of seamless brass tubing. It is $1-13/16$ inches in diameter and $4-1/16$ inches long, being cut on a 45-degree angle at the muzzlepiece end. This end is divided horizontally and vertically into four sections for a depth of $1/4$ inch by brass supports which prevent the thin rubber inlet valve from being drawn into the ferrule during exhalation. The valve is made of molded rubber and is fastened to the ferrule by two brass holders at the top. It is tongue-shaped, being $1-3/4$ inches wide and $2-1/2$ inches long. Wire, friction tape, and rubber cement are used to assemble the hose, inlet valve, and muzzlepiece connection, as described in paragraph 14.

(3) An outlet valve is located about 4 inches below the inlet valve, in such a position that it is at the bottom level of the muzzlepiece when being worn. At this point the muzzlepiece is molded to form a nozzle $3/4$ of an inch deep with an inner diameter of $1-5/8$ inches, and is flanged $1/8$ of an inch at the bottom end. The valve assembly consists of a seamless brass ferrule and a rubber outlet valve which fits over it, the entire assembly being rubber cemented inside the muzzlepiece nozzle. The ferrule is $29/32$ of an inch long and $1-1/2$ inches wide, while the rubber valve is approximately 1 inch deep. Its outer end is circular and concave, with six equally spaced apertures which open and close with exhalation and inhalation, respectively. At the center of the flat outer end of the valve are molded the lot number, date of production (month and year), and the manufacturer's identification mark. Both air and saliva

are disposed of through the valve. It is fastened to the muzzlepiece with wire, friction tape, and rubber cement, as described in paragraph 14.

(4) At the top of the muzzlepiece is an aperture for the animal's muzzle. This opening is considerably smaller than the muzzle of the smallest horse, being approximately 6 inches long at its longest point. The rear portion is $2\text{-}\frac{3}{16}$ inches wide, the opening being enlarged at the center and narrowed again at the front. It is designed to follow generally the contours of the animal's muzzle but does not cover the rear portion of the mouth. A gastight seal is obtained through the elasticity of the rubber. An embossed or depressed area $\frac{11}{32}$ of an inch wide is provided at the rear end of the aperture, and this may be cut if it is necessary to enlarge the opening to fit horses with exceptionally large muzzles. Further enlargement may be achieved by cutting $\frac{1}{16}$ to $\frac{1}{8}$ of an inch around the entire aperture. However, enlargement will be resorted to only when absolutely necessary; a better seal is obtained when the aperture is small, even though it may be more difficult to adjust the muzzlepiece. Any enlargement of the aperture will be supervised by an officer.

(5) The muzzlepiece is fastened to the halter by two straps running from the front of the piece to the upper halter rings, one strap being positioned on either side of the animal's head. Holes 1 inch long are molded into raised portions of the muzzlepiece on either side, and into the holes are inserted standard malleable iron or steel wire dee rings to which the straps are fastened, attachment being achieved by loopsnaps which are joined to the upper halter rings. Each strap is 26 inches long and $\frac{5}{8}$ of an inch wide, with a tongue buckle and two keepers.

b. Hose. (See fig. 7). (1) Including connections, the hose weigh $2\text{-}\frac{3}{10}$ pounds. The main inlet hose, extending from the T-shaped connection inside the muzzlepiece carrier

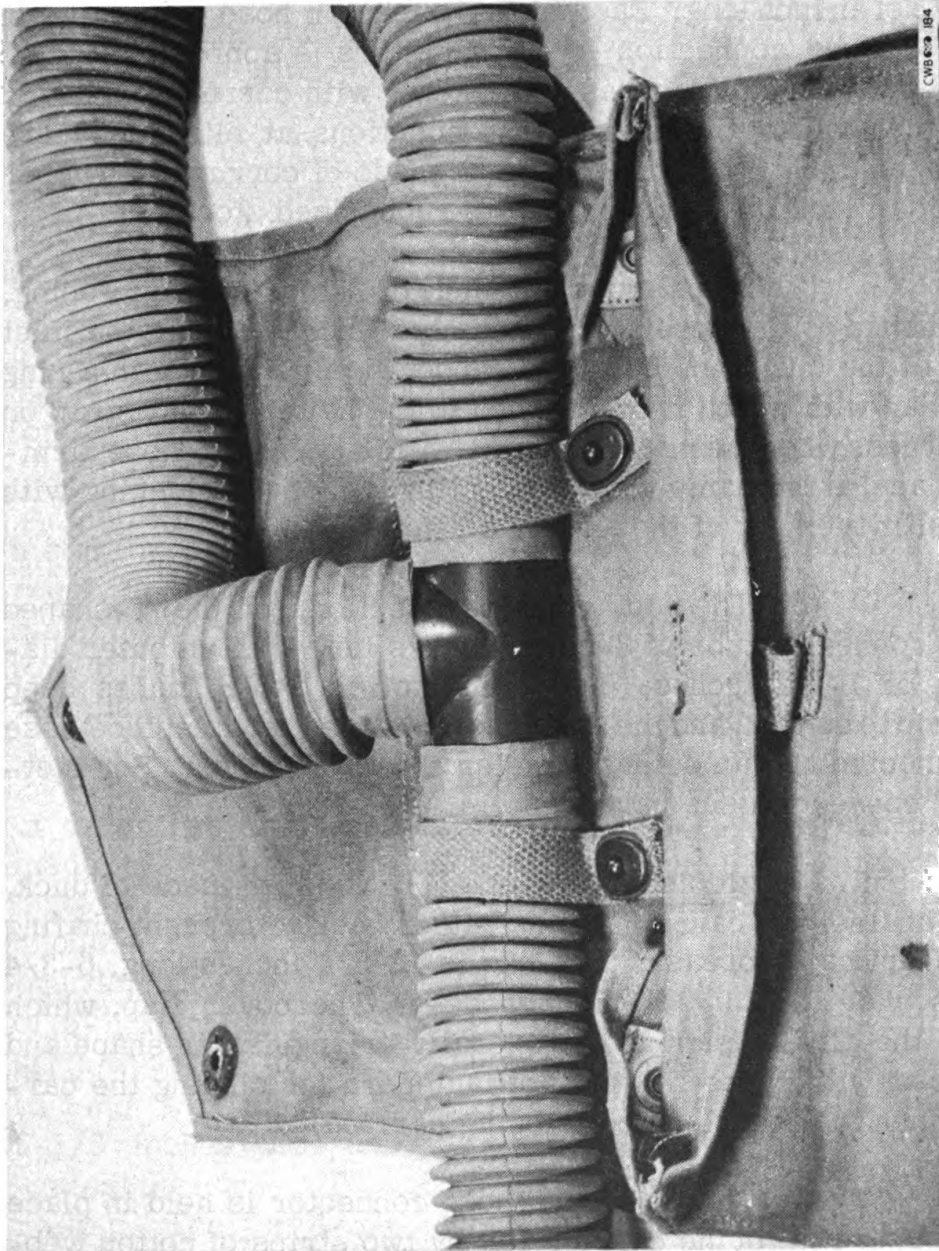


Figure 7. Hose System of Horse Gas Mask, M4
Attached to Muzzlepiece Carrier.

to the muzzlepiece proper, is approximately 28 inches long. It has an inner diameter of $1\frac{5}{8}$ inches, with corrugation $\frac{11}{32}$ of an inch thick. Uncorrugated connection pieces at either end are $\frac{7}{8}$ of an inch long. Each of the extension hose leading from the T-shaped connection to the canisters is approximately 15 inches long and $1\frac{1}{4}$ inches in diameter with corrugation $\frac{11}{32}$ of an inch thick. Uncorrugated connections at either end are $\frac{7}{8}$ of an inch long. All hose are made of corrugated rubber .055 of an inch thick, covered with rubberized stockinet.

(2) A hose support, made of 2-inch cotton webbing, is attached to the hose approximately 8 inches behind the inlet valve of the muzzlepiece. The support is equipped with a ring and snap with which it is attached to the halter throat strap on the harness when the mask is in use. This keeps the hose firmly in place, at the same time preventing it from interfering with normal movement of the animal's head.

(3) The top, or cross section, of the T-shaped brass connector tube is $3\frac{15}{16}$ inches long with an outer diameter of $1\frac{1}{2}$ inches. The connector is $2\frac{5}{8}$ inches deep from top to bottom, and the outlet to which the muzzlepiece hose is connected has an outer diameter of $1\frac{3}{4}$ inches. For method of connection see paragraph 14.

c. Muzzlepiece Carrier. (1) Although made of duck, the muzzlepiece carrier has a leather back to prevent chafing of the animal's breast. The bag is $12\frac{3}{4}$ inches long, $6\frac{3}{4}$ inches wide, and $9\frac{9}{16}$ inches deep. The cover flap, which bears the CWS insignia, is generally triangular in shape and equipped with three lift-the-dot fasteners for closing the carrier when the muzzlepiece is being carried.

(2) The T-shaped hose connector is held in place in the upper rear of the carrier bag by two strips of cotton webbing $\frac{3}{4}$ of an inch wide by $5\frac{3}{4}$ inches long. The upper ends of both strips are sewed to the carrier, while the lower ends

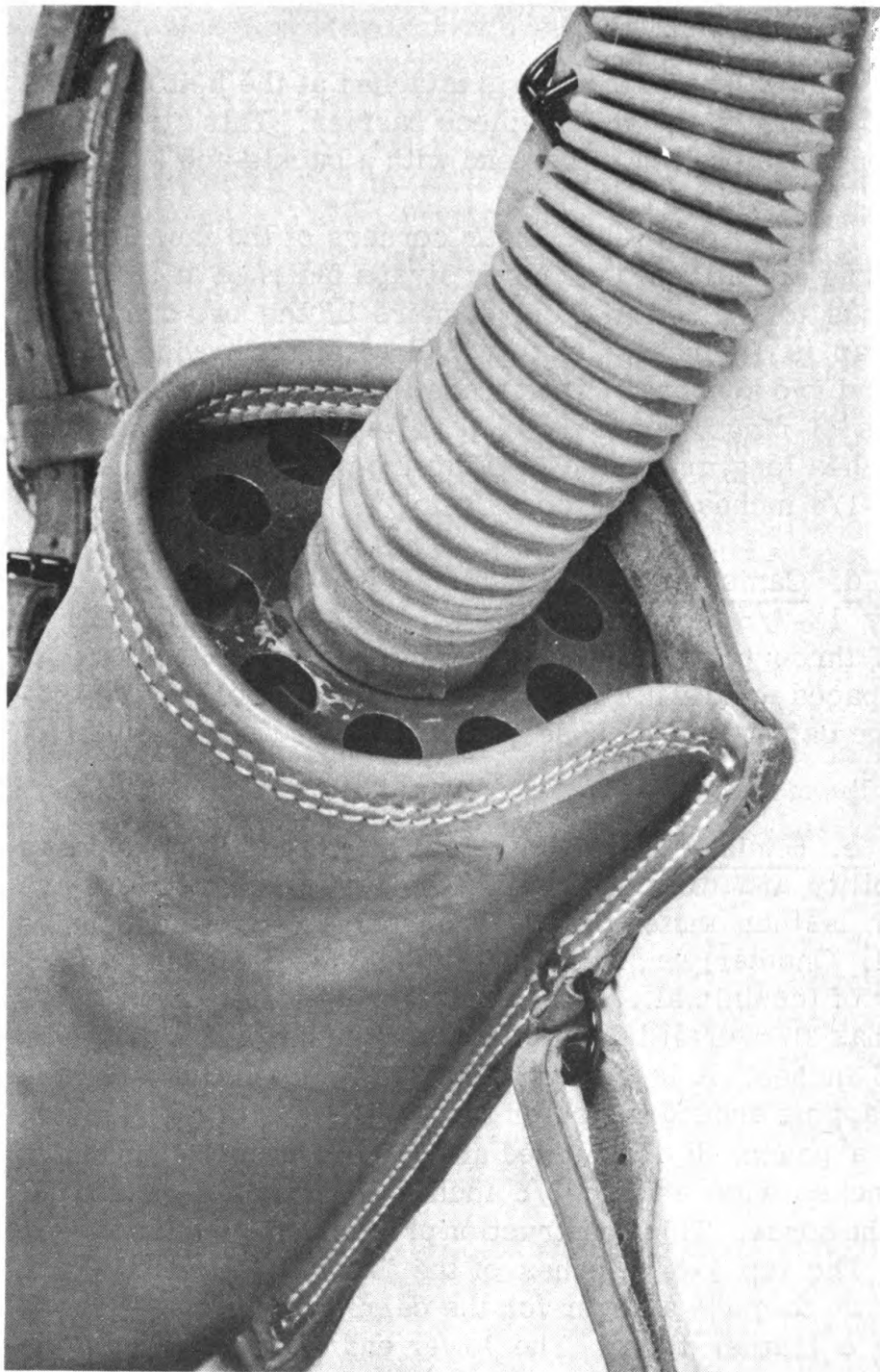
are equipped with lift-the-dot fasteners. One strip is fastened over either side of the connector.

(3) The girth strap is attached at the bottom of the leather backing of the muzzlepiece carrier. This strap is 50 inches long, equipped at either end with a buckle and keeper.

(4) At both upper rear corners of the muzzlepiece carrier bag are attached shoulder straps fastened at their opposite ends to the lower front corners of the two canisters. Each strap is 18 inches long by $\frac{5}{8}$ of an inch wide, with a buckle and two keepers. The straps are attached at both ends by means of rings. Each strap is fitted with a shoulder pad $8\frac{3}{4}$ inches long, graduated in width from 2 inches at the bottom to $1\frac{1}{4}$ inches at the top.

d. Canisters. Each canister is $4\frac{1}{2}$ inches in diameter by $12\frac{7}{8}$ inches long and weighs $3\frac{2}{5}$ pounds. Air is received through 10 round holes, each $\frac{5}{8}$ of an inch in diameter, spaced equally in a flat metal plate which fits at the bottom of the canister. The hose outlet is located in the center of this plate.

e. Canister Carriers. (See fig. 8). (1) For purposes of durability and to avoid chafing the horse, the carriers are made of leather instead of duck or some other inexpensive material. One carrier, with canister inside, is placed on each shoulder of the animal. A single carrier, weighing about $1\frac{1}{2}$ pounds, has an overall length of $13\frac{9}{16}$ inches and a diameter of $5\frac{1}{2}$ inches. It is constructed of two leather strips, one strip wrapping around the outer three-quarters of the canister to form a pouch. It is stitched and riveted to the other strip, $5\frac{1}{8}$ inches wide and $18\frac{3}{8}$ inches long, which rests flat against the horse. This construction prevents the canister from rolling. The top $4\frac{3}{4}$ inches of the flat strip is rounded and folded down to make a cover for the carrier, being fastened in place by a leather thong. The lower end of the rounded strip



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Figure 8. Canister Hose Connection on Horse Gas Mask, M4.

is turned under and sewed, forming a guard which prevents the canister from dropping out the bottom of the carrier.

(2) Three inches below the upper rear corner of each carrier is located a pommel strap 18 inches long by $\frac{5}{8}$ of an inch wide, equipped with a buckle and two keepers. The straps are fastened to the carrier with dee rings, and to the pommel with snaps. Side straps are similarly attached 3 inches from the bottom rear corner of each carrier. Each of these straps is equipped with a buckle and two keepers and are fastened to the carriers by means of dee rings. Their opposite ends are fastened to the girth.

(3) The two canister carriers are joined over the neck of the horse, immediately in front of the saddle, by means of a neck strap assembly fitted with a pad. (See fig. 9) The assembly consists of two separate straps, each 11 inches long by $\frac{7}{8}$ of an inch wide, joined by a reverse strap buckle. One strap is connected by a dee ring to the left canister; the other strap is connected to a snap, which is in turn fastened to the dee ring on the right canister. The neck pad is 6 inches long by $2\frac{5}{8}$ inches wide.

7. HORSE GAS MASK, M5. (See fig. 10). Individual components of this mask are identical with those of the M4, except as described below.

a. Canister Carrier. Both canisters are carried in a two-cell leather pouch slung on the right shoulder of the animal, the assembly weighing 9 pounds and the carrier alone, $2\frac{1}{5}$ pounds. The carrier consists of two pieces of leather. One piece, resting against the animal's shoulder, is flat. This strip is $10\frac{1}{8}$ inches wide and $18\frac{3}{8}$ inches long, the top 5 inches folding over to form a cover for the carrier. The other strip of leather is sewed to form a two-cell pouch, the bottom portion being turned under and sewed to provide a guard which prevents the canisters from dropping out through the bottom of



Figure 9. Harness of Horse Gas Mask, M4, in Position.

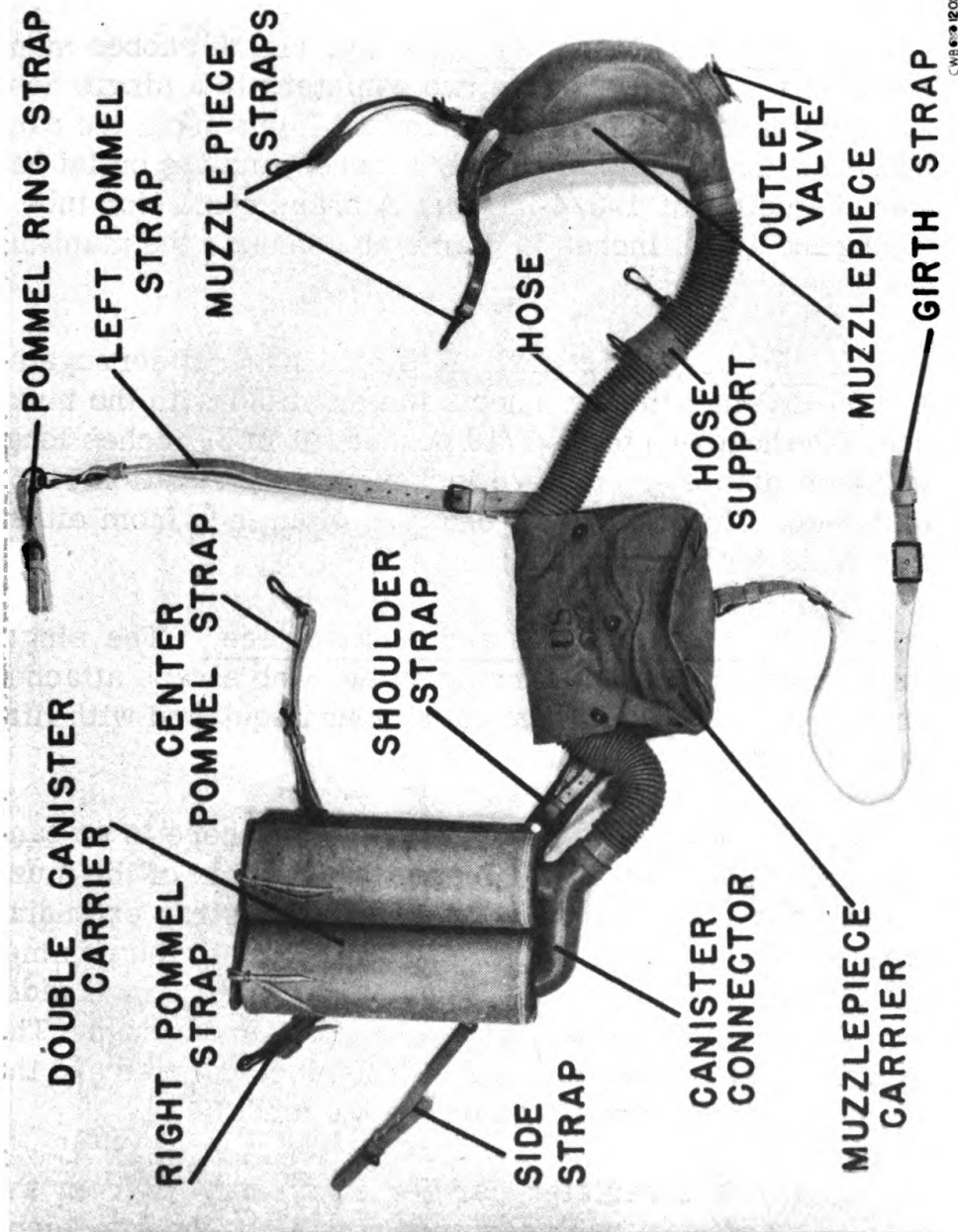


Figure 10. Nomenclature of Horse Gas Mask, M5.

the carrier. The cover for each cell is fastened individually with a leather thong.

b. Canister Connector (See fig. 11). A rubber manifold connects the air outlet of the two canisters to a single hose leading to the muzzlepiece. The manifold inlets from the canisters have an inner diameter of 1-1/2 inches, and the outlet has an inner diameter of 1-3/4 inches. A brass connector tube 2 inches long and 1-3/4 inches in diameter connects the manifold with the hose.

c. Hose (See fig. 12). A single hose of corrugated rubber .055 of an inch thick connects the manifold with the muzzlepiece. The hose weighs 2-1/10 pounds. It is 39 inches long, has an inner diameter of 1-5/8 inches, and corrugation 11/32 of an inch deep. The corrugation ends 7/8 of an inch from either end to provide for connections.

d. Carrier for Hose and Muzzlepiece. The single hose is secured inside the carrier by two web straps attached to the inside rear portion of the carrier and equipped with lift-the-dot fasteners.

e. Harness. (See fig. 13). (1) Since there is no canister for the left shoulder of the horse, the left side of the muzzlepiece carrier is supported by a left pommel strap extending from the upper left-hand corner of the carrier to the pommel of the saddle. This strap is 48 inches long and 1 inch wide, and is equipped with a buckle, three keepers, and a snap. The right shoulder strap between the muzzlepiece carrier and the canister carrier is the same as on the M4 model.

(2) The canister carrier is suspended from the saddle by three straps, each equipped with a buckle, two keepers, and a snap. The center pommel strap, 26 inches long and 5/8 of an inch wide, leads from the upper forward corner of the carrier to the center pommel on the saddle. The right

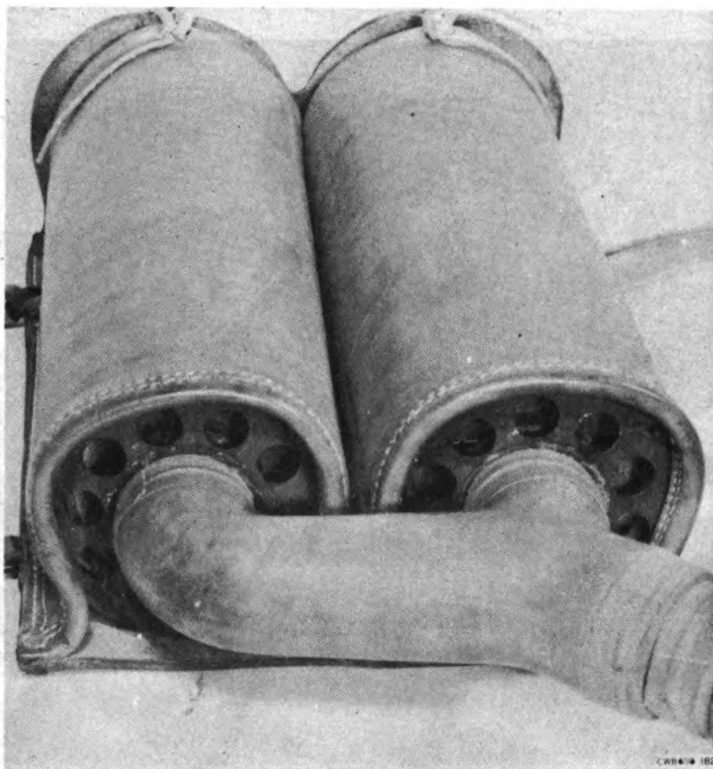


Figure 11. Canister Hose Connection of Horse Gas Mask, M5.

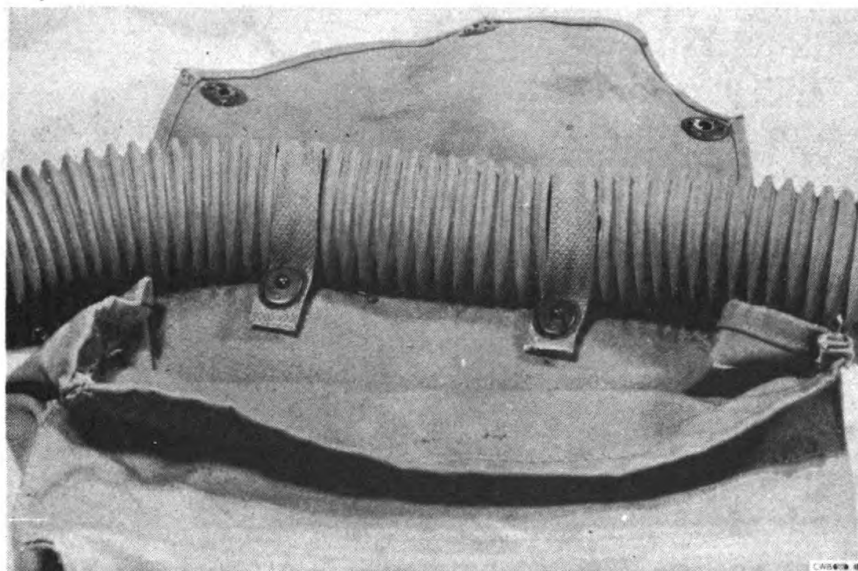


Figure 12. Hose System of Horse Gas Mask, M5.

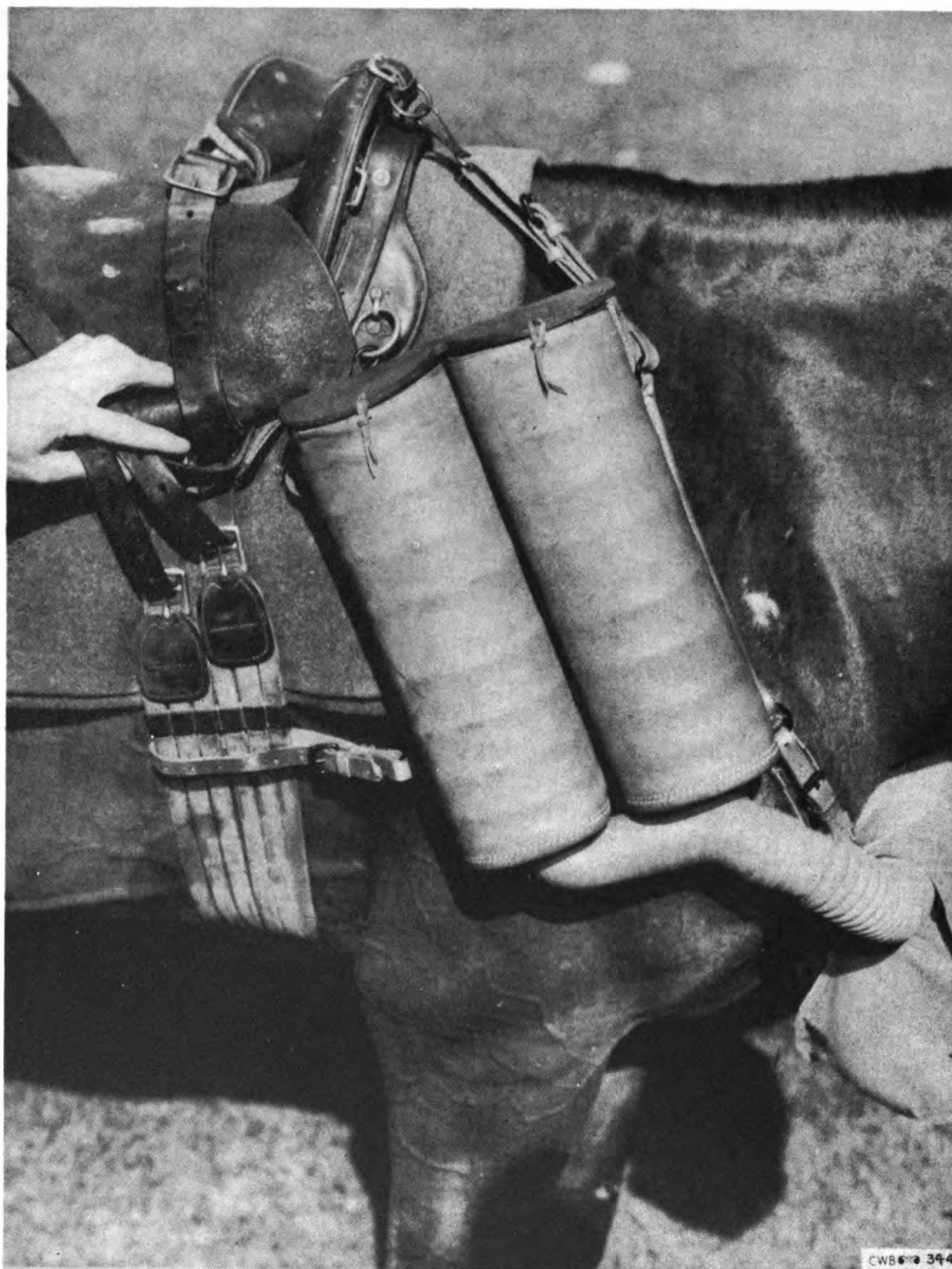


Figure 13. Canisters in Position on Horse Gas Mask, M5
Showing Harness Arrangement.

pommel strap, located at the upper rear corner of the carrier, is attached to the right side of the pommel. The right side strap leads from the lower rear corner of the carrier to the girth or to the spider ring on the saddle, depending on the type of saddle being used. The side strap is 26 inches long by 5/8 of an inch wide.

SECTION III

PACKING, STORAGE, AND SHIPMENT

8. PACKING (See figs. 14, 15, and 16). The masks are packed individually in double-wall corrugated fiberboard boxes (CWS drawings C5-12-141 for mask M4, and C5-12-143 for mask M5). The outside dimensions of the box are 19-5/8 by 12-7/8 by 13-1/2 inches, and the weight empty is approximately 5.5 pounds. The box displaces about 2 cubic feet. Total weight of the M4 mask boxed is 23 pounds, and of the M5 mask boxed, 21 pounds. The boxes are provided with corrugated spacers to insure a firm fit and prevent the masks from becoming misshapen. They are marked for identification of contents as prescribed in U. S. Army Specification No. 100-2. Markings show the name of the mask, date packed, weight of the packed container, cubic displacement, lot number, where packed, and the Chemical Warfare Service insignia.

a. In packing the M4 mask, the muzzlepiece is removed from the carrier and the hose detached from the web cotton fasteners inside the bag. The carrier is placed at the bottom of the box and the canisters positioned immediately above it, side by side. A corrugated spacer section is placed at the hose end of the carriers. Both ends of this section are bent down to the floor of the box, providing wedges against which the hose rest. A corrugated inner box is then placed over the canisters and carrier, the bottom of this box having

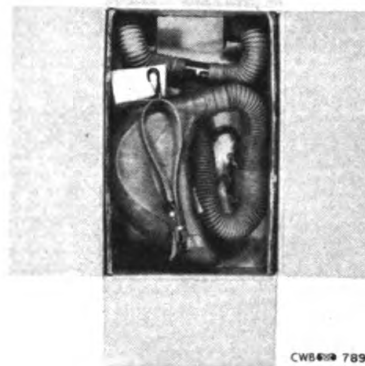
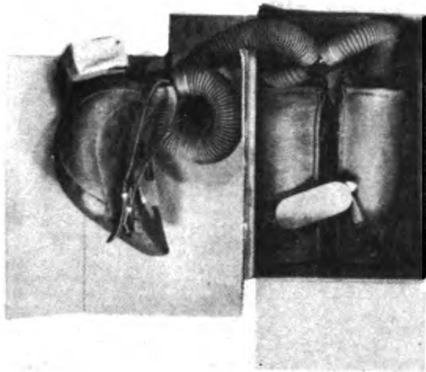


Figure 14. Method of Packing Horse Gas Mask, M4.

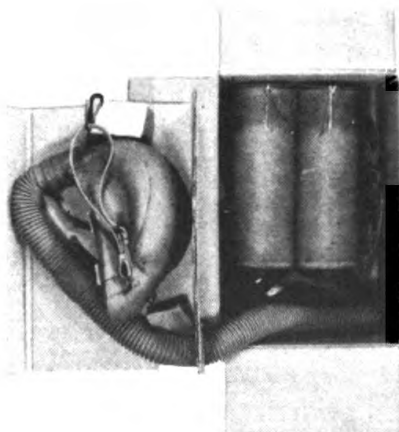


Figure 15. Method of Packing Horse Gas Mask, M5.

two holes at the hose end. One of the branch hose is allowed to protrude through each of the holes. The branch hose connector, the main inlet hose, and the muzzlepiece are then packed on top of the false bottom. A small protective corrugated box is provided to fit over the rubber outlet valve on the muzzlepiece. The snap and ring on the hose support are fastened together. The box is then ready for sealing.

b. In packing the M5 mask, the muzzlepiece carrier is detached and packed in the bottom of the box, with the two-canister carrier immediately on top. A piece of corrugated packing is placed over the rubber manifold on the lower end of the canister. An inner box is then inserted, the muzzlepiece and lower portion of the hose being packed in it as illustrated. Protective packing is placed over the rubber outlet valve on the muzzlepiece. The box is then ready for sealing.

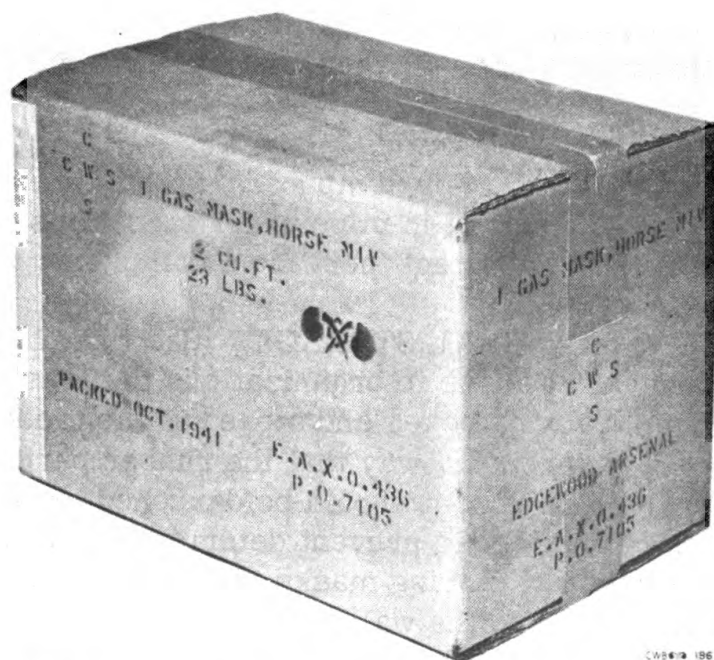


Figure 16. Packing Box for Horse Gas Mask.

9. STORAGE IN BOXES. a. In warehouses. Horse gas masks packed in boxes should be stored in warehouses which are dry, free from dust, and vermin-proof. Warehouses should be kept at the lowest practical temperature to prolong the serviceable life of the rubber parts of the masks. A storage pile two "blocks" or two box-lengths wide is the most convenient for inventory, handling, fire fighting, and fire prevention. The length of these piles is determined by the size of the building. Height of the storage pile depends upon the strength of the underpinning or floor, and also upon whether the various tiers are tied together by means of battens and dunnage. Ten tiers is the maximum depth to which the boxes should be piled, and battens and dunnage should be placed between each two tiers to permit circulation of air between the boxes. If batten and dunnage are not available, the masks should not be stacked more than three tiers deep. Boards should always be placed on the floor under the bottom tier to permit some circulation of air and to prevent direct contact with the floor. If the boxes are piled 10 tiers deep the corresponding load in pounds per square foot will be approximately 134 and 120 pounds for masks M4 and M5, respectively. For further instructions on storage in warehouses see TM 3-205.

b. In open air. For temporary field storage, boxes of gas masks may be stored in piles under tarpaulins, provided the piles are raised to protect them from dampness.

10. ORGANIZATIONAL STORAGE. (See figs. 17 and 18).
a. In garrison. After issue to organizations the masks should be removed from packing boxes and stored in the troop or battery supply room in such a way that the rubber parts will not become distorted. The room should be darkened or the masks covered with dark material to prevent deterioration by sunlight. A suggested method of storing masks in the supply room is to hang them on pegs fixed to the wall. The M4 mask is suspended by the neck strap between the two canisters, with the snaps on each pommel strap attached to the dee ring on either side of the

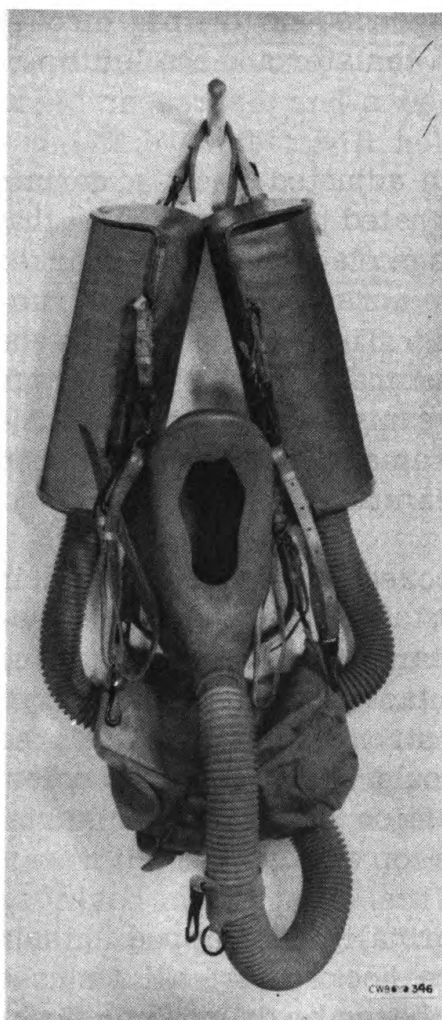


Figure 17.
Horse Gas Mask, M4
in Organizational Storage.

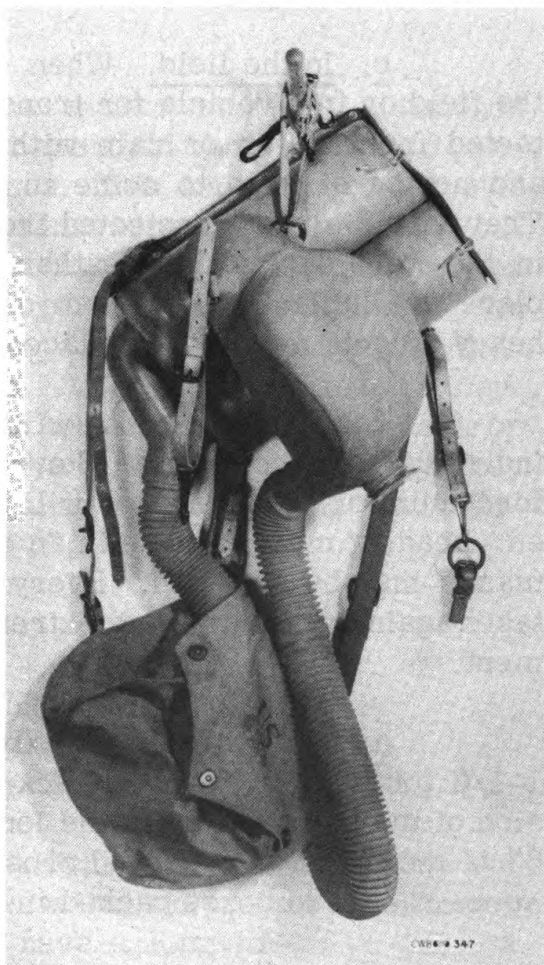


Figure 18.
Horse Gas Mask, M5
in Organizational Storage.

muzzlepiece. The M5 mask is suspended on the peg through use of the right pommel strap on the canister and the left muzzlepiece strap.

b. After a mask has been adjusted to fit a certain animal it should be kept in a designated place for use on that horse only. The mask and its storage place should be marked with the Preston brand number of the horse by means of a rubber stamp and black stamping ink. The number should be stamped immediately above the designated peg in the storage room, and at the front of the left canister carrier on the M4 mask, or near the middle of the strap attached to the left side of the muzzlepiece carrier of the M5 mask.

c. In the field. When unboxed masks are stored in the field or in a vehicle for transportation, they should be protected from water or rain with a tarpaulin or other covering and not be allowed to come in contact with the bare ground. They should also be protected from strong light. Masks stored in the field during hot weather should be kept in the coolest place available. To prevent distortion of the rubber parts, heavy objects must not be placed on top of them.

11. **LOADING.** Masks will normally be shipped in their individual packing boxes. Stevedore hooks must not be used for loading or unloading, nor will the boxes be dropped or broken. Loading must be done in an orderly manner; otherwise the masks may be damaged. Every possible precaution should be taken against moisture and extreme temperatures during shipment.

a. Truck loading. Sixty boxes can be loaded into a 1-1/2-ton truck if they are packed lengthwise (the long dimension of the box parallel to the long dimension of the truck), and 63 if the boxes are packed crosswise. A 2-1/2-ton truck will accommodate 108 boxes packed in either manner.

b. Railroad carloadings. A railroad box car with inside dimensions of 36 by 8-1/2 by 8 feet will hold 1,078 boxes packed crosswise, and a car with inside dimensions of 40-1/2 by 8-1/2 by 9 feet will hold 1,344 boxes lengthwise, or 1,480 boxes crosswise.

c. Loading unboxed masks. Loading of unboxed masks is not recommended, but where absolutely necessary it may be done if great care is exercised to prevent distortion of rubber parts. The masks will not be piled more than three tiers deep, and no canisters will be permitted to rest on top of the hose or muzzlepieces. Hose must be kept in as nearly normal a position as possible. Corrugated board should be used to separate fragile parts.

12. DESTRUCTION. Where masks must be abandoned during a retrograde movement, they should be destroyed to prevent their falling into enemy hands. This may be accomplished quickly with oil or gasoline and incendiary grenades, M14. If the masks are unboxed they may be thrown into a pile and sprayed with fuel. If boxed they should be piled to leave some air space between the boxes, thus providing a draft. The boxes will then be sprayed and the grenades fired. All parts of the mask except the canisters will burn readily and heat from the fire will destroy the protective effectiveness of the canisters, even though they remain intact. For a description and method of using the incendiary grenade, M14, see FM 23-30.

SECTION IV

CARE AND MAINTENANCE, REPAIR AND INSPECTION

13. CARE AND MAINTENANCE. a. General precautions. The mask has been designed to withstand ordinary field wear and with reasonable care will have a long life. To prevent

breakage or distortion of fragile parts, it should not be handled carelessly, packed incorrectly, or placed under heavy objects. Care should be exercised in harnessing the mask assembly to the animal, following a standard procedure which is outlined in FM 21-40. Undue exposure to moisture should be avoided to prevent the stockinet fabric from rotting. However, the mask may be carried in the rain for extended periods if necessary, but it should not be placed near a hot stove or radiator for drying.

b. Leather parts. The leather should be cleaned daily when the mask is in use, and periodically when in storage. When necessary, the harness should be completely disassembled and a damp sponge used to remove surface dust, mud, and other foreign substances. The sponge will then be rinsed and rubbed on castile or saddle soap until a creamy lather is developed. The leather should be cleaned thoroughly by drawing each strap through the lathered sponge. When the straps are partially dry they should be rubbed vigorously with a soft cloth. At infrequent intervals the leather should be treated with neat's-foot oil, but the application must be made sparingly because excessive oil is injurious.

c. Rubber parts. The muzzlepiece should be cleaned with a sponge and water after the mask has been used and periodically when in storage. After washing, the rubber must be wiped dry with a cloth. Although normal deterioration of rubber may be expected over an extended period, it may be delayed by storing the masks in dark, cool rooms.

d. Metal parts. All buckles, snaps, ferrules, and other metal parts should be wiped periodically with an oiled rag to prevent rust and corrosion. Special care should be taken to keep the inlet and outlet valves of the muzzlepiece free of debris. All metal parts on the harness must be dried thoroughly after the harness has been cleaned.

e. Muzzlepiece Carrier. Dirt, stones, twigs, and other debris should be removed from the carrier daily, since foreign material may damage the muzzlepiece and hose. The leather back of the carrier will be cleaned in the same manner as other leather parts of the mask. Holes and tears in the canvas portion of the bag should be patched.

f. Canister Carriers. The canisters cannot be removed from their carriers while the leather is being cleaned. Therefore care must be taken to keep moisture out of the canisters while the carriers are being rubbed with the wet sponge.

14. REPAIR. a. General. Unit gas officers and organization commanders will arrange for the prompt repair or replacement of unserviceable parts, and all men will be trained to report damage which might render the masks in their care ineffective. All repairs except those to the canisters can be made by the using services, replacement parts being secured from the chemical depot. Another horse gas mask should be used as a model when parts are being replaced.

b. Standard manipulation. (1) When it is necessary to remove old parts from a mask to make repairs, new parts should be installed wherever the old ones appear to be near the end of their usefulness.

(2) Rubber cement used for patching or for fastening hose to a connector may best be applied with a small brush or with the index finger.

(3) Binding wires wrapped around connections should be tightened carefully by twisting, after which all excess wire except three twists should be cut off. The turns are then bent down against the connection so that adhesive plaster may be wrapped around the wire. The plaster strip should be started by placing one end on top of the twisted portion of the wire, after which the plaster is wrapped completely around the connector

piece so that the wire twist is covered by two thicknesses of tape.

c. Canisters. Crushed canisters or those which have been wet or used in long or high concentrations of gas should be replaced at the earliest opportunity. Replacements should also be provided for canisters which have developed a very high breathing resistance. Canisters must be detached from their hose connections before being removed from the carriers. This is done by pulling off the adhesive plaster and breaking the wire fastener underneath, and then by simultaneously prying the hose with a screw driver and pulling it off. The new canister is then fitted inside the carrier, rubber cement is placed inside the hose (or manifold, on the M5 mask), and the hose or connector slipped over the canister outlet. Two strands of wire are wrapped around the connection and tightened, after which adhesive plaster is wrapped around the connection on top of the wire.

d. Tee-connector. Hose are detached from and fastened to the tee-connector on the M4 mask in the same manner as outlined above for hose-canister connections.

e. Inlet valve. (See fig. 19). (1) To replace the inlet valve, the muzzlepiece is first detached from the inlet hose by removing the adhesive plaster and wire, and by pulling the connection apart. The old inlet valve assembly is then detached from the muzzlepiece by removing the adhesive tape and wire at the rear end of the muzzlepiece. The inlet valve is removed by pulling it into the interior of the muzzlepiece and out through the aperture.

(2) The new inlet valve is inserted by reversing the procedure described above. The rubber valve flap must first be attached to the inner end of the brass ferrule with the concave side of the flap facing toward the ferrule. For lubricating purposes and to strengthen the connection once it is in

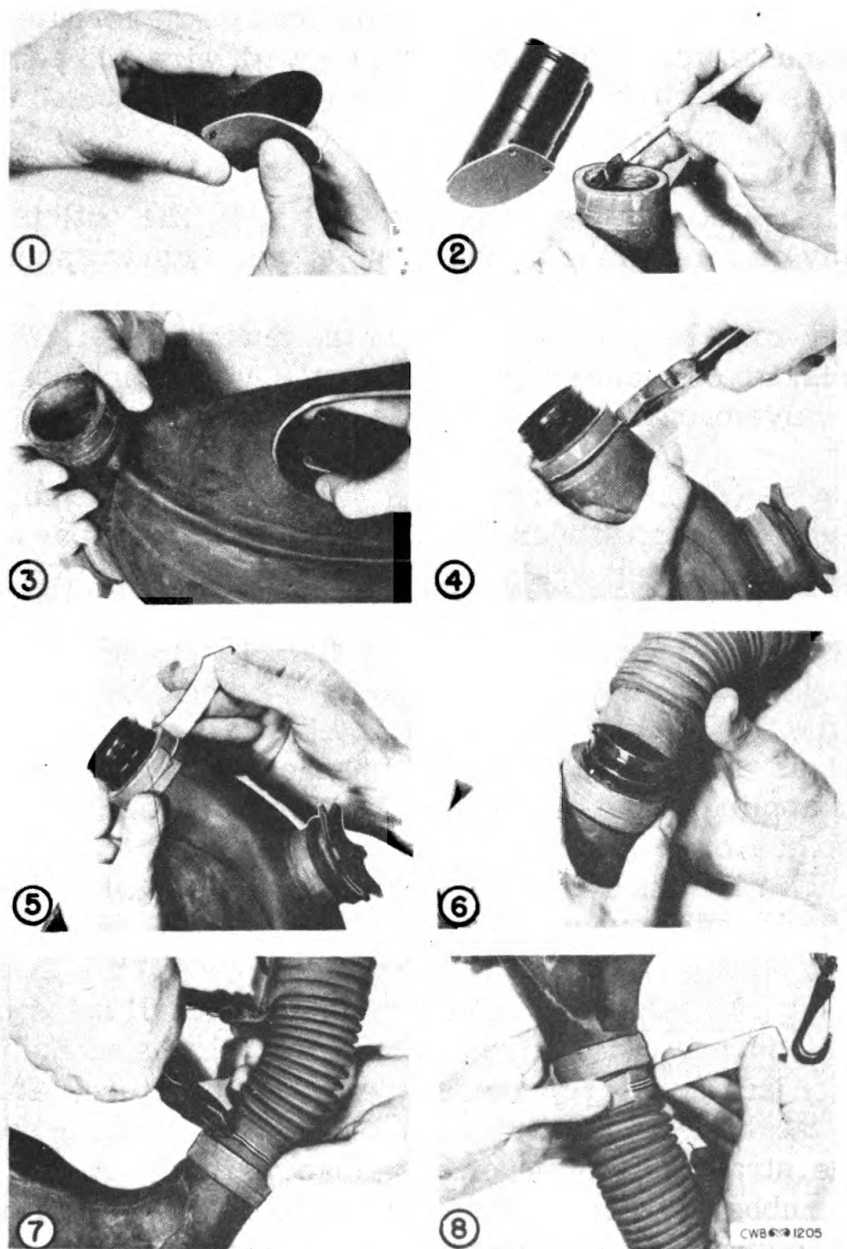


Figure 19. Procedure for Replacement of Inlet Valve.

place, rubber cement is placed on the inside surface of the muzzlepiece inlet and on the outer surface of the brass inlet valve assembly. The valve is then pushed into the muzzlepiece inlet from the inside. It should be pushed out far enough to leave room for a hose connection on the rear end of the ferrule. The valve is then fastened to the muzzlepiece with wire and adhesive plaster as described above, and the inlet hose attached to the ferrule in the same manner.

f. Outlet valve. (See fig. 20). (1) The outlet valve assembly is removed from the muzzlepiece by unwrapping the adhesive plaster and removing the wire clamp, after which the assembly may be pried loose from the muzzlepiece. The assembly is then dismantled by removing the wire which holds the rubber valve proper to the outlet ferrule.

(2) In preparing the new inlet valve assembly, the rubber valve is slipped over the ferrule so that the upper end of the valve fits snugly against the ferrule shoulder. Thus the valve seat will be in proper adjustment with respect to the ferrule. Galvanized wire, 0.032 inch in diameter, is next wrapped around the valve (near the middle of the ferrule) and twisted to hold the ferrule in place. The twisted end is cut off and bent down at an angle of 45 degrees from the coil. Rubber cement is then applied to the outside of the valve and the inside of the muzzlepiece outlet, and the valve inserted before the cement dries. It is fastened in place with binding wire, which is then covered with adhesive plaster.

g. Muzzlepiece (See fig. 21). (1) Small holes in the muzzlepiece may be repaired by applying patches on the inner and outer surfaces over the cut, tear, or puncture. Rubber around the hole should be cleaned thoroughly with a solvent (benzene, straight gasoline, or dry-cleaning fluid). A thin, even coat of rubber cement is then applied to the cleaned area and allowed to dry about 15 minutes. A second thin coat of cement is next applied and allowed to dry, after which a patch is placed

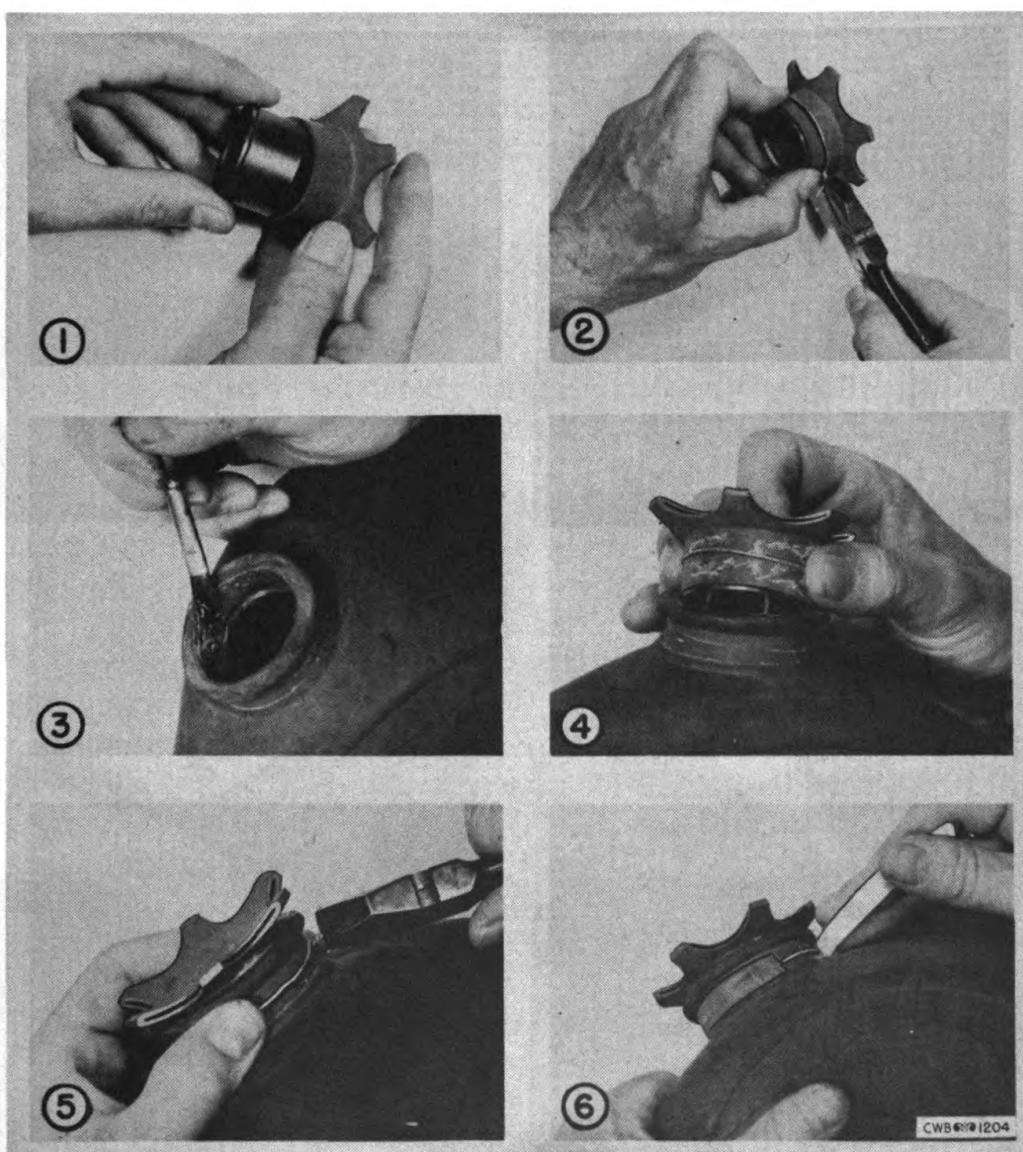


Figure 20. Procedure for Replacement of Outlet Valve.

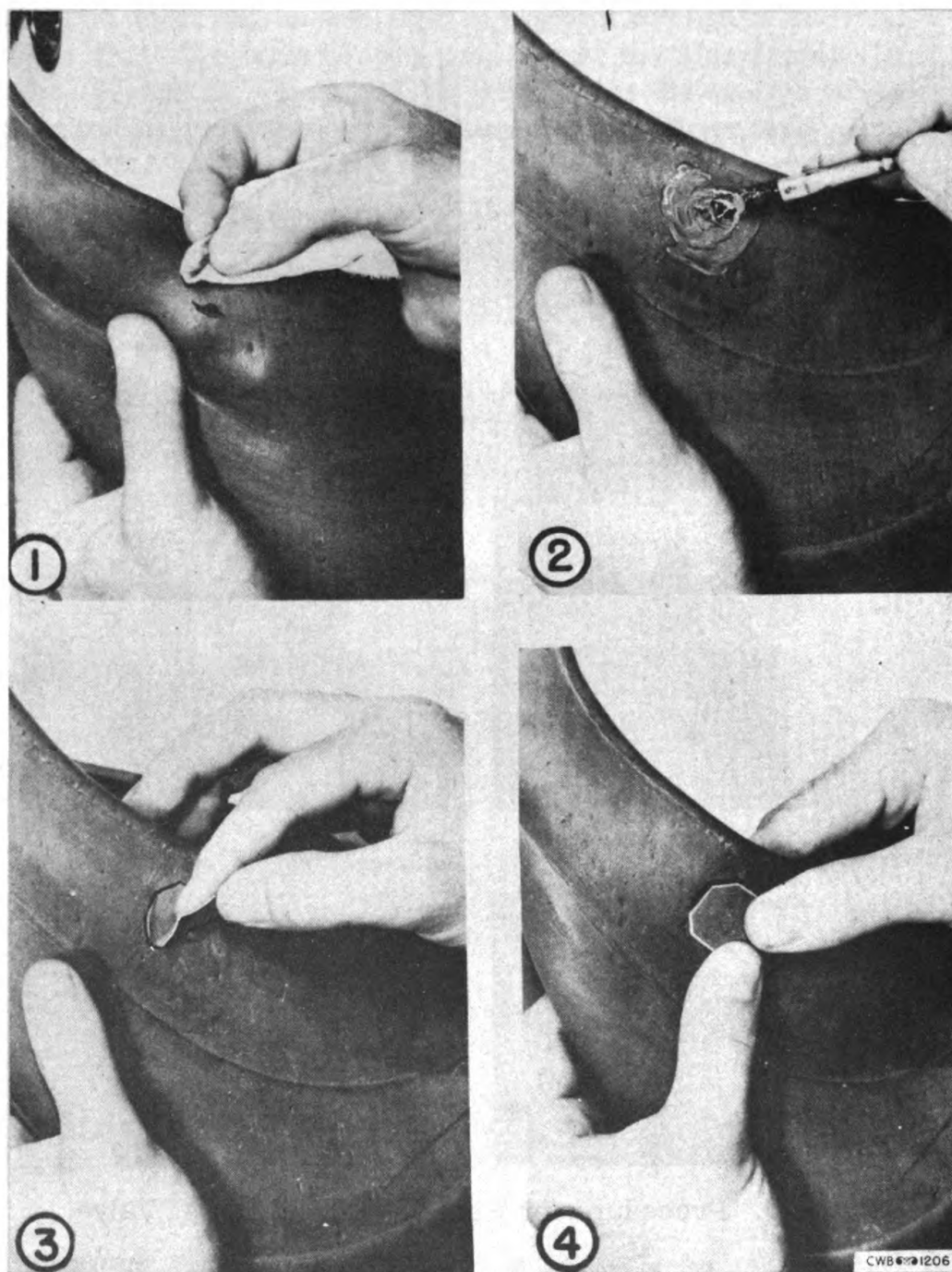


Figure 21. Procedure for Repairing Tear in Muzzlepiece.

on the area and pressed down with the fingers.

(2) As a rule, a tear in the muzzlepiece extending to the muzzle aperture cannot be repaired successfully because of the strain incident to adjustment. Except in an emergency a muzzlepiece with a defect of this nature will be replaced.

h. Hose. Damaged hose must be replaced immediately since it cannot be patched.

i. Metal parts. Damaged metal parts, such as buckles, snaps, ferrules, or tee connectors, should be replaced.

j. Carrier. Tears in the muzzlepiece carrier should be sewed immediately, before they become enlarged.

k. Harness. Straps will be patched or replaced as needed under supervision of the organization saddler.

15. INSPECTION. Every mounted trooper whose horse is equipped with a gas mask should be taught to make an habitual inspection of the assembly each day, while commanders of mounted organizations which are equipped with masks should inspect them at frequent intervals for serviceability. The unit inspection routine is outlined in FM 21-40. Points of inspection are as follows:

a. Muzzlepieces. Careful check should be made to detect holes and tears. The muzzlepiece will be placed on the animal's muzzle to make certain there is a gas-tight seal and that the muzzlepiece fits comfortably. The outlet and inlet valves will be opened manually to make certain they do not adhere to the valve seat. Both valves should be securely fastened in place. Holes in which the dee rings are inserted for the muzzlepiece straps should be checked to see if they are strong enough to support the straps. The rubber should also be checked for flexibility and to make certain it has not deteriorated.

b. Hose. All hose should be stretched and examined for holes and abrasions. Connections to the canisters and muzzlepiece are checked for leaks. Any permanent abnormal set of the hose will be investigated to determine whether it prevents normal functioning of the mask. On the M5 mask careful inspection will be made of the rubber manifold at the bottom of the canister. The most thorough method of checking hose is by applying internal air pressure while the hose is immersed in water. This method, however, requires apparatus not available to the using arms.

c. Canisters. Outside examination will not usually reveal the condition of canisters. Replacements should be provided for canisters which are broken or crushed, which have been soaked in water, or have been used for a long period in high concentrations of gas. Excessive laboring by the animal when wearing the muzzlepiece usually indicates a faulty canister, but in such cases the mask in question should be tried by other men on other horses. It can thus be determined whether a high-resistance canister is responsible.

d. Straps and hardware. All straps, buckles, snaps, and rings should be checked to make certain they are properly attached, properly adjusted to fit the horse, and in serviceable condition.

e. Muzzlepiece Carrier. Debris should not be permitted to collect inside the carrier. Straps which hold the hose in position should be inspected, as should all lift-the-dot fasteners.

16. INSPECTION BY CHEMICAL SERVICE UNITS. See TM 3-205 for inspection functions of chemical maintenance and chemical depot companies.

APPENDIX

LIST OF REFERENCES

FM 21-40 "Defense Against Chemical Attack"
FM 23-30 "Grenades"
TM 3-205 "The Gas Mask"
CWS Specification 197-51-163, Mask, Gas, Horse, M4
CWS Specification 197-51-168, Mask, Gas, Horse, M5

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